#### APPENDIX B

#### CCOW MESSAGE FORMATS

#### B.1 SCOPE

This appendix is a mandatory part of this standard. The information contained herein is intended for compliance. Each CCOW message is defined by bits within bytes. Where a portion of the available bits are not used, the bits are noted by shading. There is one exception. The unique fields in the CCOW:Channel Control Handover Request message are shaded but are to be used. These fields will be defined in MIL-STD-188-185. Terminals operating in the AC mode shall be capable of receiving and interpreting each of the CCOW messages as defined in 5.2.1.1 and this Appendix. Terminals operating in the DC mode shall be capable of receiving and interpreting each of the CCOW messages as defined in 5.2.2.1 and this Appendix.

#### B.2 CONTENTS

This appendix contains CCOW messages as follows:

CCOW Message												Ι	PAGE
CCOW:Master Frame													154
CCOW:No command													
CCOW:Slot Disconnect													
CCOW:Slot Connect													
CCOW:Link Test and Range Frame-Number													
CCOW: Channel Control Handover Request													
CCOW: Special Format Change Order													
CCOW: Call Canceled													
CCOW: TDMA Channel Reassignment													
CCOW: DASA Channel Assignment													
CCOW: Enter Guard List													
CCOW:Delete From Guard List													
CCOW: Call Waiting													
CCOW:Call in Queue		•			•							•	167
CCOW:Computer Data Transfer													168
CCOW: Information Request													169
CCOW:Zeroize													
CCOW: Time Slot Preparation													
CCOW: Requested Party Out-of-Service .													
CCOW:Transmit Control													
CCOW: Satellite Ephemeris Data Message													
CCOW:Satellite Ephemeris Data Message													
CCOW: Satellite Ephemeris Data Message													
CCOM. Parettire Thiremetts hard Messade	2	•	•	•	•	•	•	•	•	•	•	•	T / O

		BIT										
	ſ	7	6	5	4	3	2	1	0			
	1	MSB	RCCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB			
	2	PC MSB	FLAG (SET "1")	BIT 14		USER NU	JMBER					
	3					USER NU	JMBER		LSB			
	4	MSB	USER SE SUBFO	GMENT B DRMAT	LSB	MSB		EGMENT C FORMAT	LSB			
	5	MSB	ISB PARITY									
В	6		PARITY									
E	7	KG MEMORY LSB MSB USER SEGMENT A LSB PC										
	8	KG MEMORY MSB	UN BIT 15 MSB	DC FLAG	MSB	KG NE	KG NET NUMBER					
	9	MSB	KG DAY	LSB	MSB	FRAME C	OUNT					
	10				FRAM	IE COUNT						
	11				FRAM	1E COUNT			LSB			
	12	MSB			SCRAMB	LED CC KG	ID					
	13	SCRAMBLED CC KG ID										
		DC FLAG	= call ackno = distributed = Master Fr = key gener	d control ame flag	MSB PC RCCOW	= least signi = most signi = precedend = return cha = user numl	ificant bit ce cutoff annel control	orderwire				

FIGURE B-1. CCOW: Master Frame.

					ВП	-						
		7	6	5	4	3	2	1	0			
	1	MSB	RCC	DW ASSIGNI	MENT	LSB	MSB	CALL ACK	LSB			
	2	UN MSB BIT 16	FLAG (RESET "0"	BIT 14		USER NI	JMBER					
	3					USER NI	JMBER		LSB			
	4											
	5	MSB			F	PARITY						
В	6		,,,,,,		F	PARITY			LSB			
Ť	7			UN MSB COMMAND FIELD (00000)								
	8	MSB		CC	ONTROLLER	ADDRES	S					
	9			CO	NTROLLER A	ADDRESS	3		LSB			
,	10											
	11											
	12											
	13											
	,	CALL ACK FLAG LSB MSB	= Master	d nowledge Frame flag gnificant bit gnificant bit	RCCOW UN	= returr = user		ntrol orderwire				

FIGURE B-2. CCOW:No Command.

		BIT 7 6 5 4 3 2 1									
	٦	7	6	5	4	3	2	1	0		
	1	MSB	RCCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB		
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USE	R NUMBER				
	3					USE	R NUMBER		LSB		
	4				MSB	SI	LOT NUMBE	R	LSB		
	5	MSB		PARITY							
B Y T	6			PARITY							
Ė	7	USER #2 ID BIT 16	USER #2 ID BIT 15	ID   MSB COMMAND FIELD (00001)							
	8	MSB			USER	#1 ID					
	9				USER	#1 ID			LSB		
	10	Х	Υ	BIT 14	USER	#2 ID					
	11				USER	#2 ID			LSB		
	12	MSB			TIME	#1			LSB		
	13	MSB		TIME #2							
		CALL ACK FLAG LSB MSB	= not used RCCOW = return channel control orderwire  CALL ACK = call acknowledge UN = user number  FLAG = Master Frame flag X = User #1 All Ports flag  LSB = least significant bit Y = User #2 All Ports flag								

FIGURE B-3. CCOW:Slot Disconnect.

	١	7	6	5	4	3	2	1	0		
	1	MSB	RCC	DW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB		
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER I	NUMBER				
	3					USER I	NUMBER		LSB		
	4	MSB	BIT RATE	ATE LSB MSB SLOT NUMBER							
	5	MSB				PARIT	Υ				
B Y	6					PARIT	Υ		LSB		
Ē	7	USER #2 ID BIT 16	USER #2 ID BIT 15	UN BIT 15	MSB COMMAND FIELD (00010)						
	8	MSB				USEF	R #1 ID				
	9					USEF	R #1 ID		LSB		
	10	Х	Y	BIT 14		USEF	R #2 ID				
	11					USEF	R #2 ID		LSB		
,	12	MSB				TIME			LSB		
	13	MSB	MSB CHANNEL FREQUENCY CODE								
		FLAG LSB	= call ackno = Master Fr = least sign = most sign	ame flag ificant bit	RCCOV UN X Y	V= return ch = user num = Receive = Receive	nber				

FIGURE B-4. CCOW:Slot Connect.

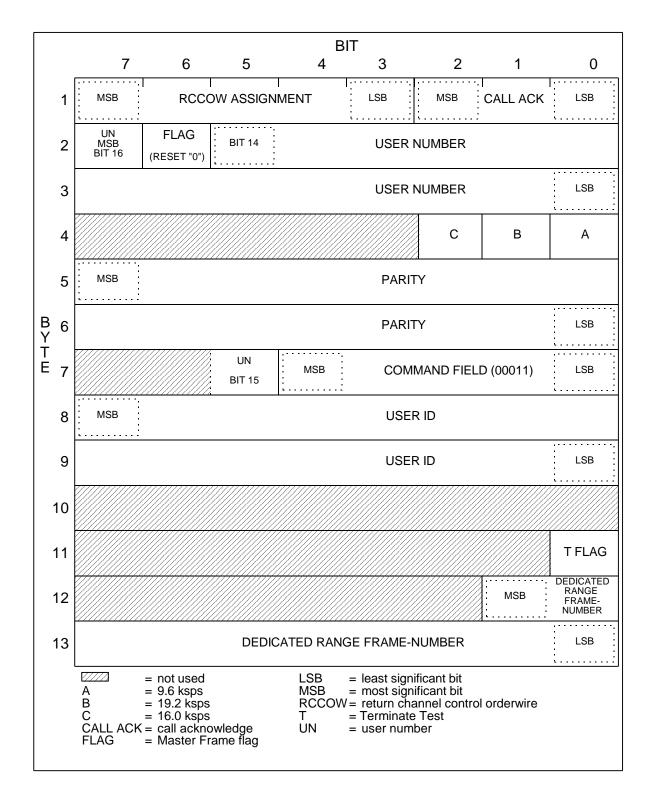


FIGURE B-5. CCOW:Link Test and Range Frame-Number Assignment.

		7	0	F	Bľ				0		
	٦	7	6	5	4	3	2	. <del>.</del> 1	0		
	1	MSB	RCCC	OW ASSIGNI	MENT	LSB	MSB	CALL ACK	LSB		
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER				
	3					USER	NUMBER		LSB		
	4		RESERVED								
	5	MSB				PARI	TY				
B Y T	6					PARI	TY		LSB		
E	7	RESE	RESERVED UN MSB COMMAND FIELD (00100)								
	8					RESE	ERVED				
	9					RESE	ERVED				
,	10					RESE	ERVED				
,	11					RESE	ERVED				
,	12					RESE	ERVED				
	13	RESERVED									
		CALL ACK FLAG LSB	C = call ackno = Master Fi = least sign	owledge came flag ificant bit	MSB RCCC UN	= mos W = retu = use	st significant urn channel o er number	bit control orderw	<i>v</i> ire		

FIGURE B-6. CCOW: Channel Control Handover Request.

		BIT								
	ſ	7	6	5	4	3	2	1	0	
	1	MSB	RCC	DW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB	
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER			
	3					USER	NUMBER		LSB	
	4	MSB	FORM SEGM SUBFO	ENT A	LSB	MSB	SEGN	MAT #2 MENT A ORMAT	LSB	
	5	MSB				PARI	TY			
В	6					PARI	TY		LSB	
E	7	AU		UN MSB COMMAND FIELD (00101)						
	8	MSB				USE	R #1 ID			
	9					USE	R #1 ID		LSB	
	10	MSB				USE	R #2 ID			
	11					USE	R #2 ID		LSB	
	12	MSB	FORM SEGM SUBFO	ENT B	LSB	MSB	SEGN	MAT #1 MENT C ORMAT	LSB	
	13	MSB	FORM SEGM SUBFO	ENT B	LSB	MSB	SEGN	MAT #2 MENT C ORMAT	LSB	
		AU CALL ACK FLAG	= not used = All-User fl = call ackno = Master Fr	wledge	LSB MSB RCC0 UN	= most :		t t ntrol orderwire	Э	

FIGURE B-7. CCOW: Special Format Change Order.

						IT			
	٦	7	6	5	4	3	2	.1	0
	1	MSB	RCC	DW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARI	ГΥ		
B Y T	6					PARI	TY		LSB
E	7			UN BIT 15	MSB	COM	MAND FIEL	D (00110)	LSB
	8	MSB				USE	R #1ID		
	9					USE	R #1ID		LSB
	10	MSB				USE	R #2ID		
,	11					USE	R #2ID		LSB
,	12	MSB				USE	R #3ID		
,	13					USE	R #3ID		LSB
		CALL ACK FLAG	= not used = call ackno = Master Fr	owledge ame flag	LSB MSB RCC UN	= least s = most s OW= return = user n		t t ntrol orderwire	Э

FIGURE B-8. CCOW: Call Canceled.

		7	6	5	BI 4	IT 3	2	1	0		
	ſ	<u>, , , , , , , , , , , , , , , , , , , </u>	l t	<u>5</u>	4	ა 					
	1	MSB	RCC	OW ASSIGNI	MENT	LSB	MSB	CALL ACK	LSB		
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER I	NUMBER				
	3					USER I	NUMBER		LSB		
	4	MSB				CHANNE	EL FREQUE	ENCY CODE	LSB		
	5	MSB				PARIT	Υ				
B Y	6					PARIT	Υ		LSB		
Ē	7	ALL- CHANGE FLAG	SAT CHANGE FLAG	HANGE MSB COMMAND FIELD (00111)							
	8	MSB				USEI	R #1ID				
	9					USEI	R #1ID		LSB		
	10	MSB				USEI	R #2ID				
	11					USEI	R #2ID		LSB		
	12	MSB				USEI	R #3ID				
	13					USEI	R #3ID		LSB		
		FLAG =	= call acknov = Master Fra = least signif	me flag	MSB RCCOW SAT CHANG UN	SEFLAG =	most signifi return char Satellite Ch user numb	icant bit nnel control o lange flag er	rderwire		

FIGURE B-9. CCOW: TDMA Channel Reassignment.

	ſ	1	BIT 7 6 5 4 3 2 1								
	- 1	,	ь	5	4	3	<u> </u>	1	0		
	1	MSB	RCCC	DW ASSIGNI	MENT	LSB	MSB	CALL ACK	LSB		
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER				
	3					USER	NUMBER		LSB		
	4	MSB		CHANNEL FREQUENCY CODE							
	5	MSB				PARI	ΤΥ				
B Y	6			PARITY							
Ē	7	ALL- CHANGE FLAG	SAT CHANGE FLAG	HANGE   MSB COMMAND FIELD (10101)							
	8	MSB				USE	R #1ID				
	9					USE	R #1ID		LSB		
1	10	MSB				USE	R #2ID				
1	11					USE	R #2ID		LSB		
1	12	MSB			TIME				LSB		
1	13	MSB		CONFIGURATION CODE							
		CALL ACK FLAG LSB MSB	FLAG = Master Frame flag RCCOW = return channel control orderwire SB = least significant bit SAT CHANGE FLAG = Satellite Change flag								

FIGURE B-10. CCOW:DASA Channel Assignment.

						IT			
	Г	7	6	5	4	3	2	1	0
	1	MSB	RCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARI	TY		
B Y T	6					PARI	TY		LSB
E	7			UN BIT 15	MSB	COM	IMAND FIEL	.D (01000)	LSB
	8	MSB				USE	R ID		
	9					USE	R ID		LSB
	10	MSB				GUA	\RD #1		
	11					GUA	\RD #1		LSB
,	12	MSB				GUA	ARD #2		
	13					GUA	\RD #2		LSB
		CALL ACK FLAG	= not used = call ackno = Master Fr	owledge ame flag	LSB MSB RCC( UN	= least s = most s OW= return = user r	significant bir significant bir channel cor number	t t ntrol orderwire	Э

FIGURE B-11. CCOW: Enter Guard List.

		7	6	5	B 4	SIT 3	2	1	0
	, [				Ī	ļ:		· I	
	1	MSB	RCCC	OW ASSIGN	IMENI	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARI	TY		
B Y T	6	,,,,,,,,,,,	,,,,,,,,			PARI	TY		LSB
Ė	7			UN BIT 15	MSB	COM	IMAND FIEL	D (01001)	LSB
	8	MSB				USE	ER ID		
	9					USE	ER ID		LSB
	10	MSB				GU/	ARD #1		
	11					GUA	\RD #1		LSB
	12	MSB				GUA	\RD #2		
	13					GUA	\RD #2		LSB
		CALL ACK FLAG	= not used = call ackno = Master Fr	owledge ame flag	LSB MSB RCC UN	= least s = most s OW= return = user r	significant bit significant bit channel cor number	t t ntrol orderwire	•

FIGURE B-12. CCOW: Delete from Guard List.

1	0
	Ţ
CALL ACK	LSB
	LSB
	LSB
0 (01010)	LSB
	LSB
,	
•	LSB
PREC	LSB
rol orderwire	е
rol	orderwire

FIGURE B-13. CCOW: Call Waiting.

		_	_	_	. В			_	
	٦	7	6	5	4	3	2	.1	0
	1	MSB	RCCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARI	TY		
В	6					PARI	TY		LSB
Ē	7			UN BIT 15	MSB	COM	MAND FIEL	.D (01011)	LSB
	8	MSB				CAL	LING PART	Y #1	
	9					CAL	LING PART	Y #1	LSB
	10	MSB				CAL	LING PART	Y #2	
	11					CAL	LING PART	Y #2	LSB
	12	MSB			זוד	ME #1			LSB
	13	MSB			TII	ME #2			LSB
	·	CALL ACK:	= not used = call ackno = Master Fra	wledge ame flag	LSB MSB RCCC UN	= least s = most s DW = return = user n	ignificant bit significant bit channel con umber	trol orderwire	

FIGURE B-14. CCOW: Call in Queue.

		_			В				
	г	7	6	5	4	3	2	1	0
	1	MSB	RCCC	OW ASSIGNI	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4	UN BIT 15							
	5	MSB				PARI	TY		
В	6					PARI	TY		LSB
E	7	MSB	PRECEDENCE	LSB	MSB	COM	IMAND FIEL	.D (01100)	LSB
	8	MSB				CAL	LED PARTY	,	
	9					CAL	LED PARTY	,	LSB
,	10	MSB				DAT	·A		LSB
,	11	MSB				DAT	Ā		LSB
,	12	MSB				DAT	Ā		LSB
,	13	MSB				DAT	Ā		LSB
	·	CALL ACK:	= not used = call ackno = Master Fra	wledge ame flag	LSB MSB RCCC UN	= least s = most s bW = return = user no	ignificant bit ignificant bit channel con umber	trol orderwire	

FIGURE B-15. CCOW:Computer Data Transfer.

		_	_	_		IT		_	_
	٦	7	6	5	4	3	2	1	0
	1	MSB	RCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PAR	ITY		
B Y T	6					PAR	ITY		LSB
Ė	7			UN BIT 15	MSB	CON	MAND FIEL	.D (01101)	LSB
	8	MSB				CAL	LED PART	<b>(</b>	
	9					CAL	LED PART	<b>(</b>	LSB
	10	MSB				CO	DE (BCD 1-9	99)	LSB
	11				RESERVE	ED*			
	12				RESERVE	ED*			
	13				RESERVE	ED*			
		BCD CALL ACK FLAG	= not used = for chann = binary-co = call ackno = Master Fr	ded decimal wledge	ta transfer	RCCOW	= least signi = most signi = return cha = user numb	nnel control o	rderwire

FIGURE B-16. CCOW: Information Request.

		7	6	5	E	3	2	1	0
	[		I		Ī				
	1	MSB	RCC	OW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PAR	ITY		
B Y T E	6					PAR	ITY		LSB
E	7			UN BIT 15	MSB	COV	MAND FIEL	D (01110)	LSB
	8	MSB				CAL	LED PARTY	′ #1	
	9					CAL	LED PARTY	′#1	LSB
,	10	MSB				CAL	LED PARTY	′ #2	
,	11					CAL	LED PARTY	′ #2	LSB
1	12								
,	13								
	t	CALL ACK	= not used = call ackno = Master Fra	wledge ame flag	LSB MSB RCC UN	= least s = most s OW = return = user n	significant bit significant bit channel con number	trol orderwire	

FIGURE B-17. CCOW:Zeroize.

		7	6	5	E	3	2	1	0
	1	MSB		I DW ASSIGN	Ι	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	: :		: <u>:</u>
	3					USER	NUMBER		LSB
	4								
	5	MSB	///////////////////////////////////////	///////////////////////////////////////	///////////////////////////////////////	PAR	ITY	///////////////////////////////////////	///////////////////////////////////////
B Y T	6					PAR	ITY		LSB
E	7	TSO		UN BIT 15	MSB	CON	MMAND FIEL	D (01111)	LSB
	8								
	9								
	10				MSB	FRA	AME COUNT		(1)1)1111111111111111111111111111111111
	11					FR/	AME COUNT		
	12					FR	AME COUNT		LSB
	13	MSB	KG DAY	LSB	KGD	MSB	KG MEMORY ADDRESS	LSB	KGM
		CZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	= not used = call acknoted = Master Fr = Change K = Change N	ame flag G Day flag	LSB MSE RCC TSC UN	B = most COW= return D = TSO	significant significant bit n channel cor flag number	trol orderwire	

FIGURE B-18. CCOW: Time Slot Preparation.

		_		_		IT			_
	٦	7	6	5	4	3	2	.1	0
	1	MSB	RCCC	DW ASSIGN	MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARI	TY		
B Y	6					PARI	TY		LSB
Ē	7			UN BIT 15	MSB	COM	MAND FIEL	LD (10000)	LSB
	8	MSB				CAL	LING PART	ϓ #1	
	9					CAL	LING PART	ϓ #1	LSB
	10	MSB				CAL	LING PART	Υ #2	
	11					CAL	LING PART	Y #2	LSB
	12	MSB				TIMI	E #1		LSB
	13	MSB				TIM	E #2		LSB
		CALL ACK:	= not used = call ackno = Master Fra	wledge ame flag	LSB MSB RCCC UN	= most s		ntrol orderwire	

FIGURE B-19. CCOW: Requested Party Out-of-Service.

		7	6	5	E 4	3	2	1	0
	1	MSB	RCC	DW ASSIGN	I MENT	LSB		CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (RESET "0")	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB			///////////////////////////////////////	PARI	TY		///////////////////////////////////////
B Y	6					PARI	TY		LSB
Ė	7	XF		UN BIT 15	MSB	COM	1MAND FIEL	D (10001)	LSB
	8								
	9								
	10								
	11								
	12								
	13								
		CALL ACK FLAG LSB	= not used = call ackno = Master Fra = least signif	wledge ame flag ricant bit	MSE RCC UN XF	B = most s COW= return = user r = Trans	number	t ntrol orderwire	·

FIGURE B-20. CCOW: Transmit Control.

					BI				
	1	7	6	5	4	3	2	1	0
	1	MSB	RCCC	OW ASSIGN	IMENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (= 0)	BIT 14	· · ·	USER	NUMBER		
	3					USER	NUMBER		LSB
	4		SAT ID	EPOCH YEAR	MSB	EPOC	H MONTH		LSB
	5	MSB				PARIT	Υ		
B Y	6					PARIT	Υ		LSB
E	7	EPHEMER (= 0		UN BIT 15	MSB	COMN	MAND FIELD	(10010)	LSB
	8	MSB			MEAN ANC	MALY			
	9				MEAN ANC	MALY			
	10				MEAN ANC	MALY			LSB
,	11	MSB			MEAN MC	TION			
	12				MEAN MC	TION			
,	13				MEAN MC	TION			LSB
	'	FLAG = =	Master Fran not used	ne flag	MSB LSB UN	= most = least = userr	significant bit significant bit number		

FIGURE B-21A. CCOW: Satellite Ephemeris Data Message 1.

MSB UN MSB BIT 16  MSB EPHEMER (=1	FLAG (= 0)	DW ASSIGN BIT 14	: MSB	USER		1 CALL ACK	USB LSB
UN MSB BIT 16	FLAG (= 0)	BIT 14	: MSB	USER USER EPOC	NUMBER NUMBER CH DAY	CALL ACK	LSB
MSB BIT 16	(= 0)	UN		USER EPOC PARIT	NUMBER CH DAY		LSB
EPHEMER				EPOC	CH DAY		LSB
EPHEMER				PARIT	ΓΥ		
EPHEMER							LSB
				PARIT	ΓΥ		LSB
							:
,		BIT 15	MSB	COM	MAND FIELD	O (10010)	LSB
MSB		E	ECCENTRICI	TY			
		E	ECCENTRICI	TY			
		E	ECCENTRICI	TY			LSB
MSB		ARGU	JMENT OF P	ERIGEE			
		ARGU	JMENT OF PE	ERIGEE			
		ARGU	JMENT OF PE	ERIGEE			LSB
FLAG = =	Master Fran not used	ne flag	MSB LSB UN	= least :	significant bi	it t	
	FLAG =	FLAG = Master Fran	MSB ARGU  ARGU  ARGU  FLAG = Master Frame flag	ARGUMENT OF PE  ARGUMENT OF PE  ARGUMENT OF PE  FLAG = Master Frame flag MSB  FLAG = not used LSB	ARGUMENT OF PERIGEE  ARGUMENT OF PERIGEE  FLAG = Master Frame flag MSB = most LSB = least	ARGUMENT OF PERIGEE  ARGUMENT OF PERIGEE  ARGUMENT OF PERIGEE  FLAG = Master Frame flag MSB = most significant b	ARGUMENT OF PERIGEE  ARGUMENT OF PERIGEE  ARGUMENT OF PERIGEE  FLAG = Master Frame flag MSB = most significant bit LSB = least significant bit

FIGURE B-21B. CCOW:Satellite Ephemeris Data Message 2.

					В	IT			
		7	6	5	4	3	2	1	0
	1	MSB	RCCC	I DW ASSIGN	I I MENT	LSB	MSB	CALL ACK	LSB
	2	UN MSB BIT 16	FLAG (= 0)	BIT 14		USER	NUMBER		
	3					USER	NUMBER		LSB
	4								
	5	MSB				PARIT	Y		
B Y T	6					PARIT	Υ		LSB
E	7	EPHEMER (= '		UN BIT 15	MSB	COMM	IAND FIELD	(10010)	LSB
	8	MSB		LONGI	TUDE OF AS	SCENDING	NODE		
	9			LONGI	TUDE OF AS	SCENDING	NODE		
,	10			LONGI	TUDE OF AS	SCENDING	NODE		LSB
	11	MSB			INCLINA	ATION			
	12				INCLINA	ATION			
	13				INCLINA	ATION			LSB
		FLAG = =	Master Fran not used	ne flag	MSB LSB UN	= most s = least s = user n	significant bit significant bit number	t	

FIGURE B-21C. CCOW: Satellite Ephemeris Data Message 3.

#### APPENDIX C

#### RCCOW MESSAGE FORMATS

#### C.1 SCOPE

This Appendix is a mandatory part of this standard. information contained herein is intended for compliance. RCCOW message is defined by bits within bytes. Where a portion of the available bits is not used, the bits are noted by shading. There is one exception. The unique fields in the RCCOW: Acknowledge Channel Control Request message are shaded but will be used. These fields will be defined in MIL-STD-188-185. Each terminal operating in the AC mode shall be able to generate each of the RCCOW messages defined herein with exceptions as follows: (1) RCCOW: Acknowledge Channel Control Request message and (2) RCCOW: Data Transfer message unless required by terminal specification. Two of the orderwire messages listed below also apply to DC mode: (1) RCCOW: Data Transfer message and (2) RCCOW: Information Report message. Controllers will generate each of the RCCOWs as defined in Section 5.

#### C.2 CONTENTS

This appendix contains RCCOW messages as follows:

RCCOW Message PAGE
RCCOW:Status Report B
RCCOW: Data Transfer (Type A)
RCCOW: Data Transfer (Type B)
RCCOW:Link Test Request
RCCOW:Call Complete
RCCOW:Out-of-Service
RCCOW: Information Report
RCCOW: Two-Party Request (or Cancel Call)
RCCOW:Conference Request (or Cancel Call)
RCCOW:Conference Party List
$RCCOW: C/N_O$ and Link Test Results
RCCOW:Status Report A
RCCOW: Acknowledge Channel Control Request
RCCOW:Guard List Report
RCCOW: Paging

					В	IT					
		7	6	5	4	3	2	1	0		
	1	MSB	1	SCF	I RAMBLED T	I ERMINAL P	(G ID	I	l		
	2			SCF	RAMBLED T	ERMINAL P	(G ID		LSB		
	3	3 RPP RPP MSB MESSAGE CODE (00001)									
	4	IE SC BIT 14 REPORTING PARTY									
	5		REPORTING PARTY								
B Y	6	MSB PORT CONFIGURATION CODE							LSB		
E	7					PC	MSB	PORT BIT RATE	LSB		
	8	MSB		5) NUMBER RD LIST	LSB	MSB		6) NUMBER RD LIST	LSB		
	9	MSB	PORT #3 ( IN GUA	7) NUMBER RD LIST	LSB	MSB		3) NUMBER RD LIST	LSB		
	10	P1 (5)	P2 (6)	P3 (7)	P4 (8)	MSB		GMENT A DRMAT	LSB		
	11	MSB		EGMENT B ORMAT	LSB	MSB		GMENT C DRMAT	LSB		
	12	MSB			PAF	RITY					
	13	3 PARITY									
IE	= not used										

FIGURE C-1. RCCOW:Status Report B.

					ВІ	Т						
		7		5 5	4	3	2	1	0			
	1	MSB	`.  : : :	SC	RAMBLED TE	RMINAL K	G ID	ļ	1			
	2			SC	RAMBLED TE	RMINAL K	G ID		LSB			
	3	RGP BIT 16	RGF BIT 1	PREC	MSB	MESSA	AGE CODE (	(01111)	LSB			
	4	IE*	IE* SC* BIT 14 REQUESTING PARTY									
	5		REQUESTING PARTY									
B Y T E	6	MSB	*. : : :		REQUESTE	) PARTY						
Ė	7			LSB								
	8	MSB	·		LSB							
	9	MSB	·		DATA BI	_OCK			LSB			
,	10	MSB			DATA BI	_OCK			LSB			
	11	MSB	`. :		DATA BI	_OCK			LSB			
,	12	MSB			PARI	ΓΥ						
	13	PARITY										
	* = AC mode only IE = Initial Entry flag LSB = least significant bit MSB = most significant bit  * PREC = precedence RGP = Requesting Party SC = Stored Call flag											

FIGURE C-2. RCCOW:Data Transfer (Type A).

					Bl	Т				
		7	6	5	4	3	2	1	0	
	1	MSB	I	SC	RAMBLED TE	RMINAL K	i G ID	l	I	
	2			SC	RAMBLED TE	RMINAL K	G ID		LSB	
	3	MSB	PREC	LSB	MSB	MESSA	AGE CODE (	(00010)	LSB	
	4	IE*	SC* MSB REQUESTING PARTY							
	5			LSB						
B Y T E	6		MSB REQUESTED PARTY							
E	7		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		REQUESTED	PARTY			LSB	
	8	MSB			DATA BL	OCK			LSB	
	9	MSB			DATA BI	OCK			LSB	
1	10	MSB			DATA BL	OCK			LSB	
1	11	MSB			DATA BI	OCK			LSB	
1	12	MSB			PARIT	Υ				
1	13	PARITY							LSB	
	= not used  * = AC mode only IE = Initial Entry flag LSB = least significant bit  MSB = most significant bit  PREC = precedence SC = Stored Call flag									

FIGURE C-3. RCCOW:Data Transfer (Type B).

		_	_	_	ВП		_		_		
	Г-	7	6	5	4	3	2	1	0		
	1	MSB	•	SCF	RAMBLED TE	RMINAL K	G ID	•			
	2	2 SCRAMBLED TERMINAL KG ID									
	3	RGP MSB BIT 16	RGP BIT 15		MSB	MESSA	AGE CODE	(00011)	LSB		
	4	IE	SC	BIT 14	RE	QUESTING	G PARTY				
	5		REQUESTING PARTY								
B Y T	6						С	В	А		
E	7										
	8										
	9										
	10										
,	11										
,	12	MSB			PARIT	Υ					
,	13				PARIT	Y			LSB		
		= not used C = 16.0-ksps flag MSB = most significant bit RGP = Requesting Party SC = Stored Call flag									

FIGURE C-4. RCCOW:Link Test Request.

					ВІ	Т						
	Г	7	6	5 5	4	3	2	1	0			
	1	MSB	: 1 : : : :	SC	RAMBLED TI	ERMINAL I	KG ID	'	-			
	2											
	3	RGP MSB BIT 16	RGP BIT 15	6D	MSB	MESS	SAGE CODE	(00100)	LSB			
	4	ΙE	SC	BIT 14	R	EQUESTIN	NG PARTY					
	5		REQUESTING PARTY									
B Y T	6		MSB TIME-SLOT NUMBER									
Ė	7	MSB CHANNEL FREQUENCY CODE							LSB			
	8											
	9											
	10											
	11											
	12	MSB	· · · · · · · · · · · · · · · · · · ·		PARI	TY						
	13			LSB								
	•		= not used RGP = Requesting Party IE = Initial Entry flag SC = Stored Call flag LSB = least significant bit SD = Slot Disconnect flag MSB = most significant bit									

FIGURE C-5. RCCOW: Call Complete.

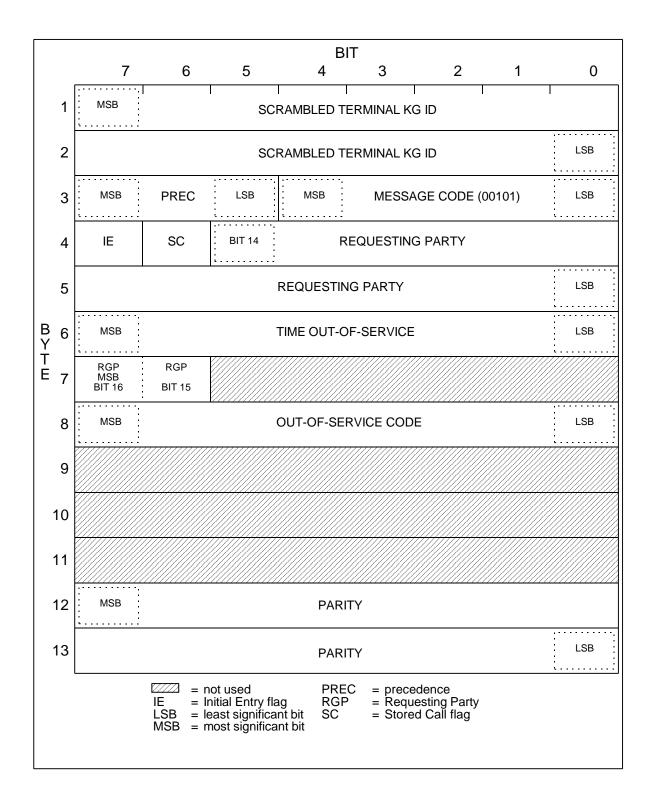


Figure C-6. RCCOW:Out-of-Service.

					Bľ	Τ					
	_	7	6	5	4	3	2	1	0		
	1	MSB		SC	RAMBLED TE	RMINAL KG	G ID	I	I		
	2			SC	RAMBLED TE	RMINAL KG	iD		LSB		
	3	RSP MSB BIT 16	RSP BIT 15		MSB	MESSA	GE CODE	(00110)	LSB		
	4	IE*	SC*	BIT 14	RI	ESPONDING	S PARTY				
	5		RESPONDING PARTY								
B Y T	6		MSB RESPONSE CODE								
Ė	7				RESPONSE	CODE			LSB		
	8	MSB			CTED DC CIF						
	9				CTED DC CIF				LSB		
,	10										
,	11										
,	12	MSB			PARII	Υ					
,	13			LSB							
		= not used  * = AC mode only  IE = Initial Entry flag HEX = hexadecimal  LSB = least significant bit  MSB = most significant bit  RSP = Responding Party  SC = Stored Call flag									

FIGURE C-7. RCCOW: Information Report.

					В	IT							
		7	6	5	4	3	2	1	0				
	1	MSB	I	SC	I CRAMBLED T	I ERMINAL	KG ID	I	I				
	2			SC	RAMBLED T	ERMINAL I	KG ID		LSB				
	3	MSB	PREC	PREC LSB MSB MESSAGE CODE (00111)									
	4	ΙE	SC	SC BIT 14 REQUESTING PARTY									
	5			REQUESTING PARTY									
B Y T	6		CC BIT 14 REQUESTED PARTY										
Ė	7				REQUESTE	D PARTY			LSB				
	8	MSB		1	CONFIGURA	TION COD	E (HEX)		LSB				
	9	RGP MSB BIT 16	RGP BIT 15	RDP MSB BIT 16	RDP BIT 15								
,	10	MSB			TIN	ИΕ			LSB				
,	11							CONTE REP	ENTION ORT*				
,	12	MSB			PARI	TY							
	13			LSB									
		= not used  * = MSB is bit 1; LSB is bit 0.  CC = Cancel Call flag  IE = Initial Entry flag  HEX = hexadecimal  * = MSB is bit 1; LSB is bit 0.  MSB = most significant bit  MSB = most significant bit  PREC = precedence  RDP = Requested Party  RGP = Requesting Party  SC = Stored Call flag											

FIGURE C-8. RCCOW: Two-Party Request (or Cancel Call).

					ВІ	Т					
	ſ	7	6	5	4	3	2	1	0		
	1	MSB	1	SC	RAMBLED TE	ERMINAL K	G ID	'	'		
	2			SC	RAMBLED TE	ERMINAL KO	G ID		LSB		
	3	MSB	PREC	LSB	MSB	MESSA	GE CODE (	(10000)	LSB		
	4	IE	IE SC BIT 14 REQUESTING PARTY								
	5	REQUESTING PARTY									
B Y	6	LF CC BIT 14 REQUESTED PARTY #1									
Ť E	7	REQUESTED PARTY #1									
	8	CONTENTION RGP MSB BIT 16 BIT 15 RDP #1 MSB BIT 16							RDP #1 BIT 15		
	9										
	10	MSB			TIME	≣			LSB		
•	11	MSB		COI	NFIGURATIO	N CODE (H	EX)		LSB		
	12	MSB			PARI	TY					
	13	PARITY							LSB		
		= not used									

FIGURE C-9. RCCOW:Conference Request (or Cancel Call).

					ВІ							
	Г	7	6	5	4	3	2	1	0			
	1	MSB		SC	RAMBLED TE	ERMINAL I	KG ID	1	'			
	2			SC	RAMBLED TE	RAMBLED TERMINAL KG ID						
	3	RDP #2										
	4	ΙE	IE SC BIT 14 REQUESTED PARTY #2									
	5		REQUESTED PARTY #2									
B Y T	6	MSB	MSB REQUESTED PARTY #3									
Ę	7			ı	REQUESTED	PARTY #3	3		LSB			
	8	MSB			RE	QUESTED	PARTY #4					
	9			ı	REQUESTED	PARTY #4	1		LSB			
	10	MSB			RE	QUESTED	PARTY #5					
	11			ı	REQUESTED	PARTY #	5		LSB			
	12	MSB			PARI	ТҮ						
,	13			LSB								
		= not used  IE = Initial Entry flag LSB = least significant bit  SC = Stored Call flag										

FIGURE C-10. RCCOW:Conference Party List.

					ВІ						
	Г	7	6	5	4	3	2	1	0		
	1	MSB		SC	RAMBLED TE	ERMINAL K	G ID				
	2			SC	RAMBLED TE	ERMINAL K	G ID		LSB		
	3	С	В	А	MSB	MESS	AGE CODE (	(01010)			
	4	ΙE	sc	SC MSB REPORTING PARTY							
	5			REPORTING PARTY							
В	6	RPP MSB BIT 16	MSB	MSB C/N <sub>o</sub> FOR CCOW							
E	7		MSB		C/N <sub>o</sub> FOR	LINK TES	T BURSTS		LSB		
	8		MSB		SYN	MBOL ERRO	ORS				
	9				SYMBOL	ERRORS			LSB		
	10	MSB		MISSED A	CQUISITIONS	8	LSB	RPP BIT 15	CF		
	11	MSB			FRAMES	TESTED			LSB		
	12	MSB			PAR	RITY					
	13		PARITY								
		A = B = C =	A = 9.6-ksps flag B = 19.2-ksps flag C = 16-ksps flag MSB = most significant bit MSB = most significant bit								

FIGURE C-11. RCCOW:  $\ensuremath{\textit{C/N}_{\circ}}$  and Link Test Results.

					В	BIT					
		7	6	5	4	3	2	1	0		
	1	MSB		SCF	RAMBLED 1	TERMINAL K	G ID	I	I		
	2	SCRAMBLED TERMINAL KG ID									
	3	RPP MSB BIT 16	RPP BIT 15		MSB MESSAGE CODE (01011)						
	4	IE	SC	BIT 14	REPOR	TING PART	Y				
	5			R	REPORTING	S PARTY			LSB		
В	6	MSB	PORT #1 (5) BR	LSB	MSB	MSB PORT #1 (5) SLOT ASSIGNMENT					
E	7	MSB PORT #2 (6) BR LSB MSB PORT #2 (6) SLOT ASSIGNMENT						LSB			
	8	MSB	MSB PORT #3 (7) BR LSB MSB PORT #3 (7) SLOT ASSIGNMENT						LSB		
	9	MSB	MSB PORT #4 (8) BR LSB MSB PORT #4 (8) SLOT ASSIGNMENT						LSB		
	10	MSB	TERMINAL VERSION	LSB	MSB	NUMBI	ER OF USE	RS IN GL	LSB		
,	11	MSB	CONTENTIO	ON REPORT	LSB	5-kHz	SFF	FC	FD		
	12	MSB			PAR	ITY					
	13	PARITY									
BR FC FD		= not used									

FIGURE C-12. RCCOW:Status Report A.

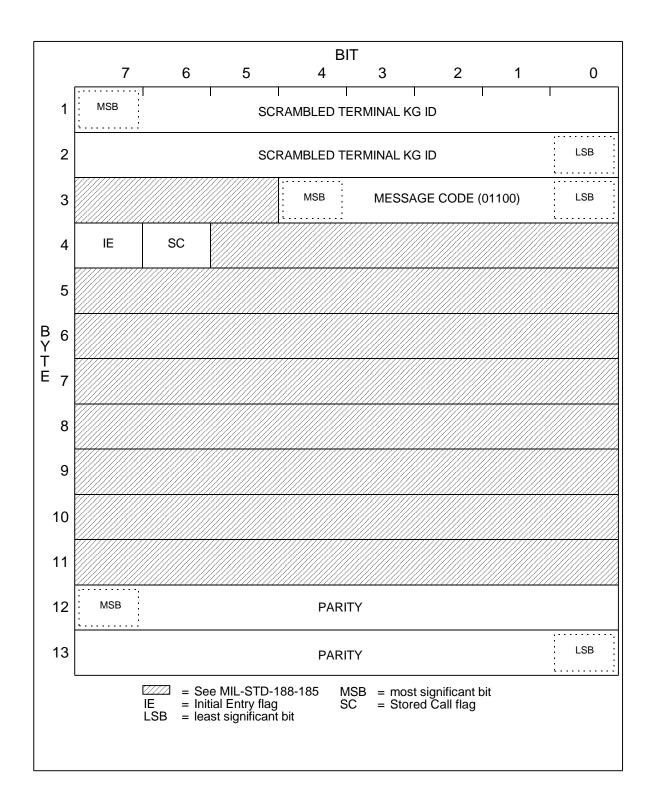


FIGURE C-13. RCCOW: Acknowledge Channel Control Request.

						 BIT					
		7	6	5	4	3	2	1	0		
	1	MSB	1	SCF	RAMBLED 1	Ι ΓERMINAL K	G ID				
	2			SCF	RAMBLED	ΓERMINAL K	G ID		LSB		
	3	MSB MESSAGE CODE (10001)									
	4	IE	SC				MSB	PORT GUARDING #1	LSB		
	5		MSB	PORT GUARDING #3	LSB		MSB	PORT GUARDING #2	LSB		
B Y T E	6	MSB GUARDED #1									
E	7	GUARDED #1									
	8	MSB GUARDED #2									
	9	GUARDED #2									
	10	MSB GUARDED #3									
	11				GUARD	ED #3			LSB		
	12	MSB			PAR	RITY					
	13	PARITY									
	= not used										

FIGURE C-14. RCCOW:Guard List Report.

					ВІ							
	ſ	7	6	5	4	3	2	1	0			
	1	MSB		SC	CRAMBLED TI	ERMINAL K	(G ID	1	'			
	2			SC	CRAMBLED TE	ERMINAL K	G ID		LSB			
	3	RGU MSB BIT 16	RGU BIT 15		MSB	MESS	AGE CODE (	(01110)	LSB			
	4	IE SC BIT 14 REQUESTING USER										
	5	REQUESTING USER LSB										
В	6	MSB REQUESTED USER #1										
E	7	REQUESTED USER #1 LSB										
	8	MSB REQUESTED USER #2										
	9	REQUESTED USER #2 LSB										
	10	MSB REQUESTED USER #3										
	11				REQUESTED	USER #3			LSB			
	12	MSB			PARI	TY						
	13	PARITY										
	= not used  IE = Initial Entry flag  LSB = least significant bit  SC = Stored Call flag											

FIGURE C-15. RCCOW: Paging.

### APPENDIX D

### FREQUENCY PLANS

### D.1 SCOPE

This Appendix is a mandatory part of this standard. The information contained herein is intended for compliance and provides the correlation between the channel frequency code and radio frequency (rf) of operation. The channel frequency codes defined herein are included in AC mode CCOW and RCCOW messages, as follows:

- Ž CCOW:Slot Connect
- $\widetilde{l}$  CCOW:TDMA Channel Reassignment
- $m{l}$  CCOW:DASA Channel Assignment
- RCCOW:Call Complete

TABLE D-I. Current and UHF Follow-On frequency plans. (This table will be used for the Channel Frequency fields. See key at end of table.)

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
0	0	NONE	NONE	NONE	N/A	
1	1	SHF	250.350	W1	N1	Fleet broadcast
2	2	SHF	250.400		N'1	II
3	3	SHF	250.450	A1	01	II
4	4	SHF	250.500		0'1	II
5	5	SHF	250.550	В1	P1	11
6	6	SHF	250.600		P'1	11
7	7	SHF	250.650	C1	Q1	11
8	8	SHF	250.700		Q'1	11
9	9	292.850	251.850	W3	N2	NAVY 25kHz CHANNELS, 41 MHz OFFSET
10	0A	292.950	251.950	A2	02	11
11	0B	293.050	252.050	В2	P2	11
12	0C	293.150	252.150	C2	Q2	11
13	0D	294.550	253.550	W4	N3	11
14	0	294.650	253.650	A3	03	11
15	0F	294.750	253.750	В3	Р3	"
16	10	294.850	253.850	С3	Q3	"
17	11	296.250	255.250	W5	N4	"
18	12	296.350	255.350	A4	04	II

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
19	13	296.450	255.450	В4	P4	NAVY 25kHz CHANNELS, 41 MHz OFFSET
20	14	296.550	255.550	C4	Q4	п
21	15	297.850	256.850	W6	N5	п
22	16	297.950	256.950	A5	05	п
23	17	298.050	257.050	B5	P5	п
24	18	298.150	257.150	C5	Q5	п
25	19	299.350	258.350	w7	N6	п
26	1A	299.450	258.450	A6	06	п
27	1B	299.550	258.550	В6	P6	п
28	1C	299.650	258.650	С6	Q6	п
29	1D	306.250	265.250	W8	N7	п
30	1E	306.350	265.350	A7	07	п
31	1F	306.450	265.450	в7	P7	п
32	20	306.550	265.550	C7	<b>Q</b> 7	п
33	21	307.750	266.750	*	N8	п
34	22	307.850	266.850	A8	08	п
35	23	307.950	266.950	В8	Р8	П
36	24	308.050	267.050	C8	Q8	П
37	25	309.150	268.150		N9	П
38	26	309.250	268.250	A9	09	Ш
39	27	309.350	268.350	В9	Р9	"

 $<sup>^{\</sup>star}$  307.750 was used as the Gapfiller channel A uplink frequency. 266.750 is not in correct use as a downlink frequency.

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
40	28	309.450	268.450	C9	Q9	NAVY 25KHz CHANNELS, 41 MHz OFFSET
41	29	310.650	269.650		N10	II
42	2A	310.750	269.750	A10	010	11
42	2A	310.750	269.750	A10	010	II .
43	2B	310.850	269.8 0	В10	P10	11
44	2C	310.950	269.950	C10	Q10	II
45	2D	293.950	260.350	A23-1		DoD 500 kHz CHANNELS/ UFO 25kHz CHANNELS
46	2E	293.975	260.375	A23-2	N11	п
47	2F	294.000	260.400	A23-3		ıı
48	30	294.025	260.425	A23-4	P11	"
49	31	294.050	260.450	A23-5		ıı
50	32	294.075	260.475	A23-6	N12	"
51	33	294.100	260.500	A23-7		"
52	34	294.125	260.525	A23-8	P12	"
53	35	294.150	260.550	A23-9		"
54	36	294.175	260.575	A23-10	011	11
55	37	294.200	260.600	A23-11		11
56	38	294.225	260.625	A23-12	Q11	11
57	39	294.250	260.650	A23-13		11

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
58	3A	294.275	260.675	A23-14	012	DoD 500 kHz CHANNELS/ UFO 25kHz CHANNELS
59	3B	294.300	260.700	A23-15		"
60	3C	294.325	260.725	A23-16	Q12	"
61	3D	294.350	260.750	A23-17		"
62	3E	294.375	260.775	A23-18		"
63	3F	294.400	260.800	A23-19		"
64	40	294.425	260.825	A23-20		"
65	41	294.450	260.850	A23-21		"
66	42	295.050	261.450	B23-1		11
67	43	295.075	261.475	B23-2		"
68	44	295.100	261.500	B23-3		"
69	45	295.125	261.525	B23-4		11
70	46	295.150	261.550	B23-5		11
71	47	295.175	261.575	B23-6	N13	"
72	48	295.200	261.600	B23-7		"
73	49	295.225	261.625	B23-8	P13	11
74	4A	295.250	261.650	B23-9		"
75	4B	295.275	261.675	B23-10	N14	n .
76	4C	295.300	261.700	B23-11		11
77	4D	295.325	261.725	B23-12	P14	"
78	4E	295.350	261.750	B23-13		"
79	4F	295.375	261.775	B23-14	N15	"

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
80	50	295.400	261.800	B23-15		DoD 500 kHz CHANNELS/ UFO 25kHz CHANNELS
81	51	295.425	261.825	B23-16	P15	11
82	52	295.450	261.850	B23-17		11
83	53	295.475	261.875	B23-18	N16	11
84	54	295.500	261.900	B23-19		11
85	55	295.525	261.925	B23-20	P16	11
86	56	295.550	261.950	B23-21		11
87	57	295.650	262.050	C23-1		11
88	58	295.675	262.075	C23-2	013	11
89	59	295.700	262.100	C23-3		11
90	5A	295.725	262.125	C23-4	Q13	11
91	5B	295.750	262.150	C23-5		11
92	5C	295.775	262.175	C23-6	014	11
93	5D	295.800	262.200	C23-7		11
94	5E	295.825	262.225	C23-8	Q14	11
95	5F	295.850	262.250	C23-9		11
96	60	295.875	262.275	C23-10	015	11
97	61	295.900	262.300	C23-11		11
98	62	295.925	262.325	C23-12	Q15	II
99	63	295.950	262.350	C23-13		11
100	64	295.975	262.375	C23-14	016	11
101	65	296.000	262.400	C23-15		11

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
102	66	296.025	262.425	C23-16	Q16	DoD 500 kHz CHANNELS/ UFO 25kHz CHANNELS
103	67	296.050	262.450	C23-17		11
104	68	296.075	262.475	C23-18		11
105	69	296.100	262.500	C23-19		11
106	6A	296.125	262.525	C23-20		11
107	6B	296.150	262.550	C23-21		11
108	6C	297.150	263.550	W2-1		11
109	6D	297.175	263.575	W2-2	N17	11
110	6E	297.200	263.600	W2-3		11
111	6F	297.225	263.625	W2-4	P17	11
112	70	297.250	263.650	W2-5		11
113	71	297.275	263.675	W2-6	N18	11
114	72	297.300	263.700	W2-7		11
115	73	297.325	263.725	W2-8	P18	11
116	74	297.350	263.750	W2-9		11
117	75	297.375	263.775	W2-10	017	11
118	76	297.400	263.800	W2-11		11
119	77	297.425	263.825	W2-12	Q17	11
120	78	297.450	263.850	W2-13		11
121	79	297.475	263.875	W2-14	018	11
122	7A	297.500	263.900	W2-15		11
123	7в	297.525	263.925	W2-16	Q18	11

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
124	7C	297.550	263.950	W2-17		DoD 500 kHz CHANNELS/ UFO 25kHz CHANNELS
125	7D	297.575	263.975	W2-18		11
126	7E	297.600	264.000	W2-19		11
127	7F	297.625	264.025	W2-20		"
128	80	297.650	264.050	W2-21		"
129	81	302.445	248.845		N27	GAPFILLER 500 kHz CHANNELS/ UFO 5 kHz CHANNELS
130	82	302.450	248.850	G1		"
131	83	302.455	248.855		N28	11
132	84	302.465	248.865		N29	11
133	85	302.475	248.875	G2	N30	11
134	86	302.485	248.885		N31	11
135	87	302.495	248.895		N32	11
136	88	302.500	248.900	G3		11
137	89	302.505	248.905		N33	11
138	8A	302.515	248.915		N34	11
139	8B	302.525	248.925	G4	N35	11
140	8C	302.535	248.935		N36	11
141	8D	302.545	248.945		N37	11
142	8E	302.550	248.950	G5		11

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
143	8F	302.555	248.955		N38	GAPFILLER 500 kHz CHANNELS/ UFO 5 kHz CHANNELS
144	90	302.565	248.965		N39	11
145	91	302.575	248.975	G6	027	11
146	92	302.585	248.985		028	11
147	93	302.595	248.995		029	11
148	94	302.600	249.000	G7		11
149	95	302.605	249.005		030	"
150	96	302.615	249.015		031	11
151	97	302.625	249.025	G8	032	11
152	98	302.635	249.035		033	"
153	99	302.645	249.045		034	"
154	9A	302.650	249.050	G9		"
155	9В	302.655	249.055		035	11
156	9C	302.665	249.065		036	"
157	9D	302.675	249.075	G10	037	11
158	9E	302.685	249.085		038	"
159	9F	302.695	249.095		039	"
160	A0	302.700	249.100	G11		II
161	A1	302.705	249.105		P27	11
162	A2	302.715	249.115		P28	"
163	A3	302.725	249.125	G12	P29	"
164	A4	302.735	249.135		P30	"

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
165	A5	302.745	249.145		P31	GAPFILLER 500 kHz CHANNELS/ UFO 5 kHz CHANNELS
166	A6	302.750	249.150	G13		"
167	A7	302.755	249.155		P32	"
168	A8	302.765	249.165		P33	n .
169	A9	302.775	249.175	G14	P34	11
170	AA	302.785	249.185		P35	11
171	AB	302.795	249.195		P36	11
172	AC	302.800	249.200	G15		"
173	AD	302.805	249.205		P37	"
174	AE	302.815	249.215		P38	"
175	AF	302.825	249.225	G16	P39	"
176	во	302.835	249.235		Q27	"
177	В1	302.845	249.245		Q28	11
178	В2	302.850	249.250	G17		"
179	В3	302.855	249.255		Q29	11
180	В4	302.865	249.265		Q30	"
181	В5	302.875	249.275	G18	Q31	"
182	В6	302.885	249.285		Q32	II
183	в7	302.895	249.295		Q33	"
184	В8	302.900	249.300	G19		11
185	В9	302.905	249.305		Q34	"
186	BA	302.915	249.315		Q35	"

	CHANNEL NUMBER		DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
187	BB	302.925	249.325	G20	Q36	GAPFILLER 500 kHz CHANNELS/ UFO 5 kHz CHANNELS
188	вс	302.935	249.335		Q37	ıı .
189	BD	302.945	249.345		Q38	"
190	BE	302.950	249.350			"
191	BF	302.955	249.355		Q39	"
192	CO	307.750	254.150	GA		GAPFILLER 25 kHz (UFO CHAN N8 UPLINK)
193	C1	311.150	257.550	GB		GAPFILLER 25 kHz
194	C2	316.955	243.855	W9		AFSAT/ LEASAT NON-PROC. 5 kHz REPLACE- MENT CHANNELS
195	C3	316.960	243.860	W10		"
196	C4	316.975	243.875	W11		"
197	C5	317.000	243.900	W12		"
198	С6	317.010	243.910	W13		"
199	С7	317.015	243.915		N19	"
200	С8	317.025	243.925		N20	"
201	С9	317.035	243.935		N21	"

	CHANNEL NUMBER		DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
202	CA	317.045	243.945	A11	N22	AFSAT/ LEASAT NON-PROC. 5 kHz REPLACE- MENT CHANNELS
203	СВ	317.055	243.955	A12	N23	"
204	CC	317.065	243.965	A14	N24	II
205	CD	317.075	243.975	A16	N25	"
206	CE	317.085	243.985	A18	N26	"
207	CF	317.090	243.990	A19		"
208	DO	317.095	243.995	A20	019	"
209	D1	317.100	244.000	A21		"
210	D2	317.105	244.005		020	"
211	D3	317.110	244.010	A22		"
212	D4	317.115	244.015		021	"
213	D5	317.125	244.025		022	"
214	D6	317.135	244.035		023	"
215	D7	317.145	244.045	B11	024	"
216	D8	317.155	244.055	В12	025	"
217	D9	317.165	244.065	В14	026	"
218	DA	317.175	244.075	в16	P19	"
219	DB	317.185	244.085	В18	P20	"
220	DC	317.190	244.090	В19		11
221	DD	317.195	244.095	B20	P21	11

CHANNI NUMBE		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES	
DECIMAL	HEX	(MHz)	(MHz)				
222	DE	317.200	244.100	В21		AFSAT/ LEASAT NON-PROC. 5 kHz REPLACE- MENT CHANNELS	
223	DF	317.205	244.105		P22	II	
224	EO	317.210	244.110	В22		11	
225	E1	317.215	244.115		P23	"	
226	E2	317.225	244.125		P24	n n	
227	E3	317.235	244.135		P25	11	
228	E4	317.245	244.145	C11	P26	11	
229	E5	317.255	244.155	C12	Q19	11	
230	E6	317.265	244.165	C14	Q20	11	
231	E7	317.275	244.175	C16	Q21	"	
232	E8	317.285	244.185	C18	Q22	11	
233	E9	317.290	244.190	C19		11	
234	EA	317.295	244.195	C20	Q23	11	
235	EB	317.300	244.200	C21		п	
236	EC	317.305	244.205		Q24	11	
237	ED	317.310	244.210	C22		11	
238	EE	317.315	244.215		Q25	II	
239	EF	317.325	244.225		Q26	II	
240	FO	307.550	253.950		NATO IVB/ SKYNET 4A	25KhZ/ 25kHz (UK)	
241	F1	307.700	254.100		NATO IVA	25kHz	

### APPENDIX D

CHANNEL NUMBER		UPLINK FREQUENCY	DOWNLINK FREQUENCY	PRESENT CHANNEL	UFO CHANNEL	NOTES
DECIMAL	HEX	(MHz)	(MHz)			
242	F2	311.050	257.450		NATO IVB/ SKYNET 4A	25KhZ/ 25kHz (UK)
243	F3	311.200	257.600		NATO IVA	25kHz
244	F4	307.750	254.150		SKYNET 4B	25kHz (UK)
245	F5	311.250	257.650		SKYNET 4B	25kHz (UK)
246	F6	307.650	254.050		SKYNET 4C	25kHz (UK)
247	F7	311.150	257.550		SKYNET 4C	25kHz (UK)
248	F8	294.800 to 314.800	253.650 to 254.350		SKYNET 4D	** 25kHz (UK)
249	F9	298.300 to 318.300	257.150 to 257.850		SKYNET 4D	** 25kHz (UK)
250	FA					
251	FB					
252	FC					
253	FD					
254	FE					
255	FF					

<sup>\*\*</sup> The uplink and downlink frequencies associated with these channel frequency codes should be front panel programmable in 25-kHz increments over the frequency ranges shown.

Key to channel numbers: Table D-I lists several plans used on UHF satellites for DoD. Fleet satellite communications (FLTSATCOM) satellites use frequency plans A, B, and C. Leased Satellites (LEASATs) use frequency plans X, Y, and Z, which are abbreviated versions of plans A, B, and C (LEASATs have fewer channels). In addition, LEASAT has plan W, which shares frequencies with Air Force satellite communications (AFSATCOM) polar frequency plan E. Gapfiller has been labeled for this table as G. UHF Follow-On (UFO) uses four frequency plans, N, O, P, and Q. In addition,

### APPENDIX D

there are alternate fleet broadcast downlink frequencies labeled  $N^{\prime}$  ,  $O^{\prime}$  ,  $P^{\prime}$  , and  $Q^{\prime}$  .

Table D-I lists present Channel and UFO Channel as follows: Frequency plan, transponder number, and an optional transponder subdivision. As an example, Channel Number 46 (Hex 2E) is A23-2. This corresponds to FLTSATCOM frequency plan A, a DoD 500-kHz wideband channel (used as a 25-kHz subchannel) which is being replaced by UFO 25-kHz channel N11 (frequency plan N, transponder 11).

APPENDIX D

(This page intentionallyt left blank)

#### APPENDIX E

### DERIVATION OF FREQUENCY ACCURACY VALUES

#### E.1 SCOPE

This appendix is not a mandatory part of the standard. The information contained herein is intended for guidance only. The appendix provides one possible derivation of the frequency accuracy values specified in 5.6.1 and 5.6.2.

### E.2 ASSUMPTIONS

The assumptions used to derive these values originate from a number of studies performed by the Services and industry. Review of these studies permitted convergence to a nearly worst-case set of assumptions. Worst-case assumptions were not used in all cases to derive the frequency accuracy values. However, the assumptions for new-design equipment were reviewed and chosen to allow operation under nearly all circumstances. The 13 assumptions are:

- ! The satellite inclination angle  $A_i$  equals  $\pm$  10 degrees, corresponding to a maximum satellite velocity of 80.5 meters per second in the direction of a controller or terminal located at worst-case latitude.
- ! The maximum frequency translation error of the satellite transponder is 5 Hz.
- ! The accuracy of the terminal's reference frequency is  $3.0 \times 10^{-8}$  or better.
- ! The accuracy of the controller's reference frequency is  $5 \times 10^{-8}$  or better.
- ! The frequency error caused by satellite eccentricity is negligible.
- ! The maximum uplink satellite frequency  $(F_{UL})$  is 311 MHz and the maximum downlink satellite frequency  $(F_{DL})$  is 270 MHz.
- ! The controller and the terminals may be located at latitudes of up to 70 degrees.
- ! The controller may have a maximum velocity of 55 knots (28.3 meters per second).
- ! The terminal may have a maximum velocity of 800 knots (412 meters per second).

#### APPENDIX E

- ! The terminal's maximum Doppler rate of change is  $32 \, \mathrm{Hz/sec^2}$ .
- ! The controller's maximum Doppler rate of change is negligible.
- ! The frequency measurement error of either the controller or the terminal is 20 Hz.
- ! The frequency setting error of either the controller or the terminal is 2.3 Hz.

#### E.3 ERROR CALCULATION PROCEDURE

This appendix uses a procedure described in a paper prepared for IEEE TCC-90 by Dr. Edward W. Chandler, Ph.D, A Frequency Tracking Technique for Multiple Access Satellite Communication Networks. By using the procedure in conjunction with the above assumptions, the terminal's uplink and downlink frequency errors are calculated. These errors represent one set of conditions that result in the specified frequency accuracy values. The procedure used to determine these errors is based on frequency measurements on one type of burst, i.e., orderwire bursts from the controller. More elaborate techniques could be used to produce smaller frequency errors or to produce errors within these same limits under conditions that are worse than those stated in the above assumptions.

### E.4 CONTROLLER UPLINK ERROR CALCULATION

To obtain the uplink and downlink frequency accuracies for a terminal, it is necessary to first determine the controller's uplink error. It is assumed the controller is using a frequency tracking technique that limits its uplink error at the satellite output to 30 Hz, as stated in 5.6.1 a. Derivation of this value will be shown. Uplink error includes errors from all sources, including the satellite transmitter and satellite translation error. Since frequency differences caused by satellite inclination angle and by the controller's latitude and velocity are compensated for by the controller, the tracking computation used by the terminal is independent of the frequency differences caused by these sources. For the controller a table of observable, and therefore correctable, errors can be constructed. Table E-I depicts these errors and is similar to Table VI in the TCC-90 paper.

In Table E-I,  ${}^aF_{OBS,i(max)}$  is the maximum frequency offset that can be observed for the i-th source, and  $CF_{UL,i}$  is the uplink

#### APPENDIX E

correction factor for the *i*-th source. By reducing and reordering this table, similar to the manner in which Table VI is reduced to Table VII in the TCC-90 paper, the optimum uplink correction factor can be determined using the procedure described in that paper. The table is reduced by combining those offset sources with identical correction factors, and reordered by listing the sources in order of smallest to largest correction factor, as shown in Table E-II.

TABLE E-I. Controller frequency errors.

ROW	OFFSET SOURCE	) F <sub>OBS, i (max)</sub> (Hz)	$\mathit{CF}_{\scriptscriptstyle{UL,i}}$
1	Satellite to controller motion	210.7 (1)	$-F_{\scriptscriptstyle UL}/\left(F_{\scriptscriptstyle UL}+F_{\scriptscriptstyle DL} ight)$
2	Satellite translation error	5.0	-1
3	Controller frequency error	2.3	0
4	Controller reference frequency error	2.1 (2)	$-F_{\scriptscriptstyle UL}/\left(F_{\scriptscriptstyle UL}\ -\ F_{\scriptscriptstyle DL} ight)$
5	Controller frequency measurement error	20.0	0

Notes:

(1) Maximum satellite (SAT) velocity is considered to be 80.5 meters per second, as determined by an approximation for operation at 70 degrees latitude. The maximum controller velocity is 28.3 meters per second. The frequency contribution from satellite motion relative to the controller is

$$[(80.5 + 28.3)/(3.0 \times 10^8)][(311 + 270) \times 10^6] = 210.7 \text{ Hz}$$

(2) The controller's receiver and transmitter share the same reference frequency source. The error is

$$(311 - 270) \times 10^6 \times (5.0 \times 10^{-8}) = 2.1 \text{ Hz}.$$

TABLE E-II. Controller uplink errors (reduced table).

i	CONTRIBUTING ROW NUMBERS	) F <sub>OBS, i (max)</sub> (Hz)	$CF_{\scriptscriptstyle UL,i}$		
1	4	2.1	$-F_{UL}$ / $(F_{UL} - F_{DL}) = -7.585$		
2	2	5.0	-1		
3	1	210.7	$-F_{UL}$ / $(F_{UL} + F_{DL}) = -0.535$		
4	3 and 5	22.3	0		

#### APPENDIX E

The optimum correction factor  $CF_{U\!L}$  is for i = 3, since that is the row farthest down the table where the sum of all maximum offsets in all rows beneath and including that row is greater than the sum of all maximum offsets in all rows above that row. This correction factor may then be used in equation 5 from the TCC-90 paper, repeated here for convenience, to determine the controller's maximum uplink error.

Using the equation

controller value stated in 5.6.1 a.

\*
$$E_{UL}$$
 \* $E_{UL}$  \* $E_{$ 

This value has been rounded up to 30 Hz for the standard's

= 29.1 Hz

### E.5 TERMINAL UPLINK AND DOWNLINK FREQUENCY ERRORS

The same procedure is used to analyze the uplink and downlink errors for the terminal. It is assumed the terminal has achieved initial frame acquisition and that burst-to-burst frequency tracking is being performed by the terminal. To determine the terminal's uplink and downlink errors, a table similar to Table IX in the TCC-90 paper is created. Table E-III shows the results.

TARLE.	E-III.	Terminal	frequency	errors.
تسمح		TCTTTTTTT	TTEGRETICA	CTTOTO.

ROW	OFFSET SOURCE	)F <sub>OBS,i(max)</sub> (Hz)	$CF_{\scriptscriptstyle UL,i}$	$CF_{\scriptscriptstyle DL,i}$
1	Controller uplink error	30.0 (1)	0	0
2	Terminal frequency measurement error	20.0	0	0
3	Satellite motion toward terminal	72.5 (2)	$-f_{\scriptscriptstyle U\!L}$ / $f_{\scriptscriptstyle D\!L}$	1
4	Terminal motion toward satellite	370.8 (3)	$-f_{\scriptscriptstyle UL}$ / $f_{\scriptscriptstyle DL}$	1
5	Terminal reference frequency error	8.1 (4)	$f_{\scriptscriptstyle UL}$ / $f_{\scriptscriptstyle DL}$	1
6	Terminal acceleration (over 1 frame)	20.6 (5)	0	0

#### APPENDIX E

#### Notes:

- (1) 30 Hz represents the assumed worst-case controller uplink offset.
- (2) The frequency contribution from satellite motion, assuming  $A_i$  = 10, is  $(8.05/3.0 \times 10^8)(A_i)(270.0 \times 10^6)$  = 72.5 Hz
- (3) The frequency contribution from the terminal's motion is  $(412/3.0 \times 10^8)(270.0 \times 10^6) = 370.8 \text{ Hz}$
- (4) The terminal's reference frequency error is its specified accuracy of  $3.0 \times 10^{-8}$  multiplied by the maximum receive frequency of 270 MHz.
- (5) The frequency contribution from the terminal's doppler acceleration in a period of one frame is  $32~{\rm Hz/sec^2}$  multiplied by the proportion allocated to receive (270/(270 + 311)) multiplied by the frame length of 1.386 seconds.

Reducing and reordering this table for the terminal's uplink error calculation yields results shown in Table E-IV.

TABLE E-IV. Terminal uplink errors (reduced table).

i	CONTRIBUTING ROW NUMBERS	) F <sub>OBS, i(max)</sub> (Hz)	$CF_{\scriptscriptstyle UL},\ _i$
1	3 and 4	443.3	$-F_{UL} / F_{DL} = - 1.152$
2	1, 2, and 6	70.6	0
3	5	8.1	$F_{UL} / F_{DL} = 1.152$

Here, the optimum correction factor is for i equal to 1. Solving equation 5 from the TCC-90 paper yields:

$$^*E_{UL}^*_{max} = ^*-1.152 - 0^*(70.6) + ^*-1.152 - 1.152 ^*(8.1)$$
  
= 100.0 Hz

The terminal's worst-case uplink frequency accuracy is 100.0 Hz and is equal to the standard's terminal uplink frequency accuracy value specified in 5.6.1.

#### APPENDIX E

Reducing and reordering the table for the terminal's downlink frequency error yields results shown in Table E-V.

TABLE E-V. Terminal downlink errors (reduced table).

i	CONTRIBUTING ) $F_{OBS, i(max)}$ ROW NUMBERS (Hz)		$\mathit{CF}_{\scriptscriptstyle DL,\ i}$
1	1, 2, and 6	70.6	0
2	3, 4, and 5	451.4	1

Here, the optimum correction factor is for i=2. Equation 6 from the TCC-90 paper is identical to equation 5, except for replacement of UL subscripts with DL. Using equation 6 from the TCC-90 paper yields

$$^*E_{DL}^*_{max} = ^*1 - 0^*(70.6)$$
  
= 70.6 Hz

To obtain the total downlink frequency accuracy requirement for the terminal, consider the case of a different type terminal transmitting with a frequency error of up to 240 Hz. In this situation the transmitting terminal is not compliant with 5.6.1 herein, but is compliant with the requirements of 5.6.1 in MIL-STD-188-183 dated 18 September 1992. Since the receiving terminal's own downlink may also be in error by as much as 70.6 Hz, the total downlink frequency accuracy required by a receiving terminal is the sum of these values, or 310.6 Hz. This value is approximated as 310 Hz and specified as such in 5.6.2.

### CONCLUDING MATERIAL

Custodians:

Preparing Activity:

Army - CR Navy - EC Air Force - 90 DISA - DC1 (Project TCSS-1831)

### Review Activities:

Army - AC, IE, IQ, IR, SC, PT
Navy - CG, MC, OM, NC, TD
Air Force - 02, 13, 17, 21, 29,
33, 93
DLA - DH
NSA - NS
DMA - MP

# Civil Agency Coordinating Activities:

DOT - OST

(This page intentionally left blank.)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

### **INSTRUCTIONS**

- 1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
- 2. The submitter of this form must complete blocks 4, 5, 6, and 7.
- 3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

(-)						
LDECOMMEND A CHANCE.	1. DOCUMENT NUMBE	ER: 2	2. DOCUM	IENT DATE (YYMMDD)		
I RECOMMEND A CHANGE:	MIL-STD-188-1	83A	980	320		
3. DOCUMENT TITLE: Interoperability	Standard for 25-kHz	UHF TDMA/DAMA Terminal	Wavefo	orm		
4. NATURE OF CHANGE (Identify paragraph number	er and include proposed re	write, if possible. Attach extra sheets	as neede	d.)		
5. REASON FOR RECOMMENDATION						
6. SUBMITTER						
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION				
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Co	de)	7. DATE SUBMITTED (YYMMDD)		
		(1) Commercial		()		
		(2) AUTOVON (if applicable)				
8. PREPARING ACTIVITY						
a. NAME:  Joint Interoperability and Engineering Organization (JIEO)		b. TELEPHONE (Include Area Co (1) Commercial: (732) 427-6865		AUTOVON: <b>987-6865</b>		
c. ADDRESS (Include Zip Code) ATTN: JEBBC Fort Monmouth, NJ 07703-5613		IF YOU DO NOT RECEIVE A REP Defense Quality and Standardization O 5203 Leesburg Pike, Suite 1403, Falls Telephone (703) 756-2340 AUT	ffice	2041-3466		

DD Form 1426, OCT 89 Previous editions are obsolete. 108-290